

# TRIP REPORT

*State of Alaska  
Department of Fish and Game*

*Field Date(s):* March 8 – 15, 2021

*Location(s):* **Arctic-Bornite Prospect**

*Objective(s):* To determine if fish overwinter in Subarctic Creek

*Participant(s):* Chelsea Clawson (ADF&G) and Kelsey Stockert (Ambler Metals)

*Weather:* Cold and sunny, some snowstorms

*Access:* A-Star helicopter and snowmachine

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On March 8, 2021, we flew to the Arctic-Bornite prospect to conduct fish sampling. My main objective was to minnow trap open water areas in upper Subarctic Creek to see if Dolly Varden overwinter in the upstream reaches of the creek. Additionally, I assisted Kelsey Stockert, Environmental Coordinator for Ambler Metals, with 1) sampling various surface water locations around the Arctic and Bornite deposits for water quality parameters, 3) sampling groundwater wells around the Arctic deposit for water quality parameters, and 4) conducting snow depth and density surveys in Subarctic valley.

We snowmachined to two road accessible sites, Wesley Creek and Ruby Creek (road crossing), and two off-road sites, Shungnak River at the mouth of Ruby Creek and Ruby Creek just upstream of the mouth. We collected water samples for laboratory analysis and measured flow rates. Wesley Creek had open water and Ruby Creek had about 3 inches of ice with flowing water below (Figure 1).



**Figure 1.** Wesley Creek (left) and Ruby Creek just upstream of the bridge (right)

The Shungnak River at the mouth of Ruby Creek had approximately 3 feet of ice with flowing water below. On Ruby Creek just upstream of the mouth there was a thick layer of frozen overflow on the ice (Figure 2). There was approximately 5 feet of ice with only a few inches of silt and water underneath the ice. We collected water samples and measured flow on the

Shungnak River, but were unable to collect data on Ruby Creek since there was not sufficient flow under the ice.



**Figure 2.** Sampling sites on the Shungnak River at the mouth of Ruby Creek (left) and on Ruby Creek just upstream of the mouth (right).

All other sample sites were accessed using an A-star helicopter. Surface water sampling was conducted at upper Subarctic Creek, mid Subarctic Creek, Subarctic Creek at the gaging station, and on the Shungnak River at the gaging station downstream of the mouth of Subarctic Creek (Figures 3 and 4). There was open water at upper and mid Subarctic, and the ice was approximately 4 inches thick with flowing water underneath at the gaging station on Subarctic Creek. There was a mix of frozen and slushy overflow at the Shungnak River downstream of the mouth of Subarctic Creek that bound up the ice auger and prevented us from obtaining water samples. Minnow traps were set in open water at upper Subarctic Creek and mid Subarctic Creek and allowed to soak overnight (Figure 4 and Table 1).



**Figure 3.** Flowing water under ~4 inches of ice at the gaging station on Subarctic Creek (left) and overflow on the Shungnak River at the gaging station downstream of the mouth of Subarctic Creek.



**Figure 4.** Checking minnow traps at upper Subarctic Creek (left) and open water at mid Subarctic Creek (right).

**Table 1.** Fish sampling sites (WGS84) March 2021.

Sample Site	Latitude	Longitude	DV captured
Upper Subarctic (SCUP)	67.1926	-156.3911	1
Mid Subarctic (SCMI)	67.1668	-156.4207	0

Minnow trapping conditions were challenging at upper and mid Subarctic Creek. Although the water was open and flowing, it was between 6 and 8 inches deep, making it difficult to submerge the throats of the minnow traps. It was  $-20^{\circ}\text{F}$  during the day and below  $-30^{\circ}\text{F}$  at night, so many of the entrances to the minnow traps froze up overnight, preventing fish from entering (Figure 5). Despite these difficulties, one Dolly Varden was captured in the most upstream minnow trap at upper Subarctic Creek (Figure 6). Since the air temperature was  $-20^{\circ}\text{F}$  the fish was not removed from the water, but was estimated to be about 4 inches fork length.



**Figure 5.** Ice that formed on a minnow trap at mid Subarctic during an overnight set.



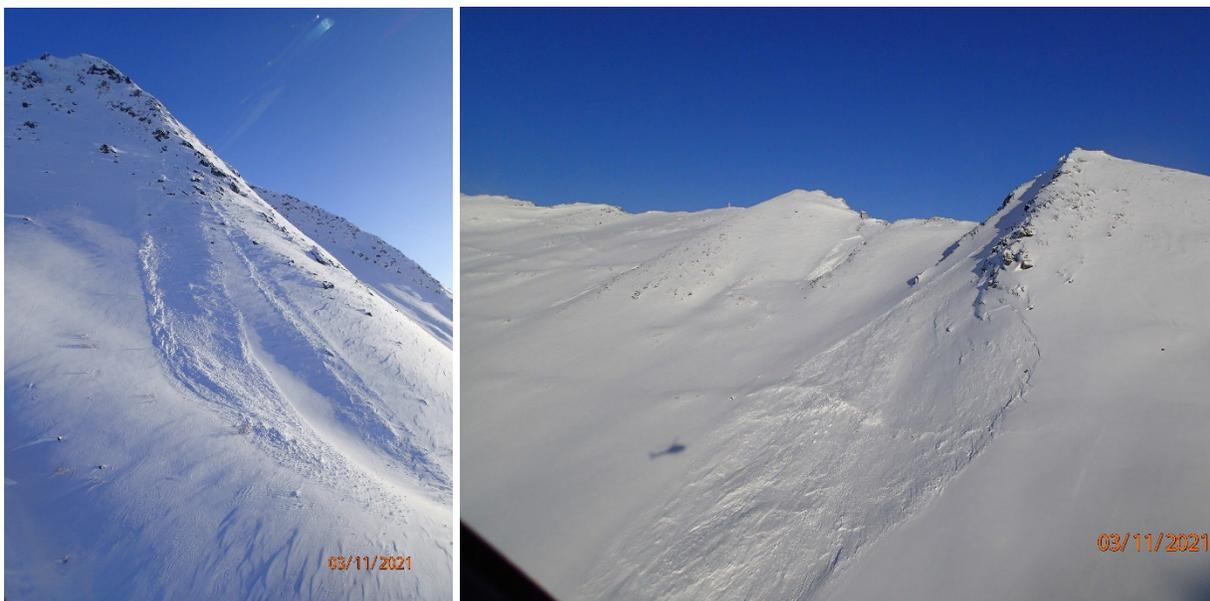
**Figure 6.** Dolly Varden captured at upper Subarctic Creek on March 12, 2021.

Although only one Dolly Varden was captured at upper Subarctic Creek, this does confirm that Dolly Varden overwinter in the open water reaches of Subarctic Creek, and they likely overwinter in other areas of Subarctic Creek since the creek has flowing water all winter and does not freeze solid.

After we completed surface water and fish sampling, I assisted Kelsey Stockert with groundwater well sampling and snow depth and density surveys throughout the Subarctic valley (Figure 7). Snowpack was lower than observed in previous recent winters, although was still 40 – 60 inches deep in non-windswept areas. A snowstorm that deposited ~14 inches of snow on March 9 -10 created some instability and resulted in numerous avalanches throughout the valley, which had not been observed before by Ambler Metals staff (Figure 8).



**Figure 7.** Pumping water from a groundwater well (left) and conducting a snow survey (right) below the Arctic deposit.



**Figure 8.** Avalanches through the Subarctic valley.